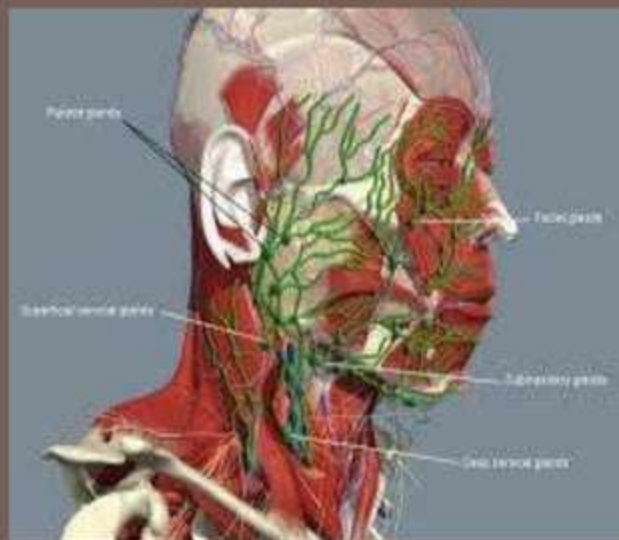


LYMPHATIC SYSTEM

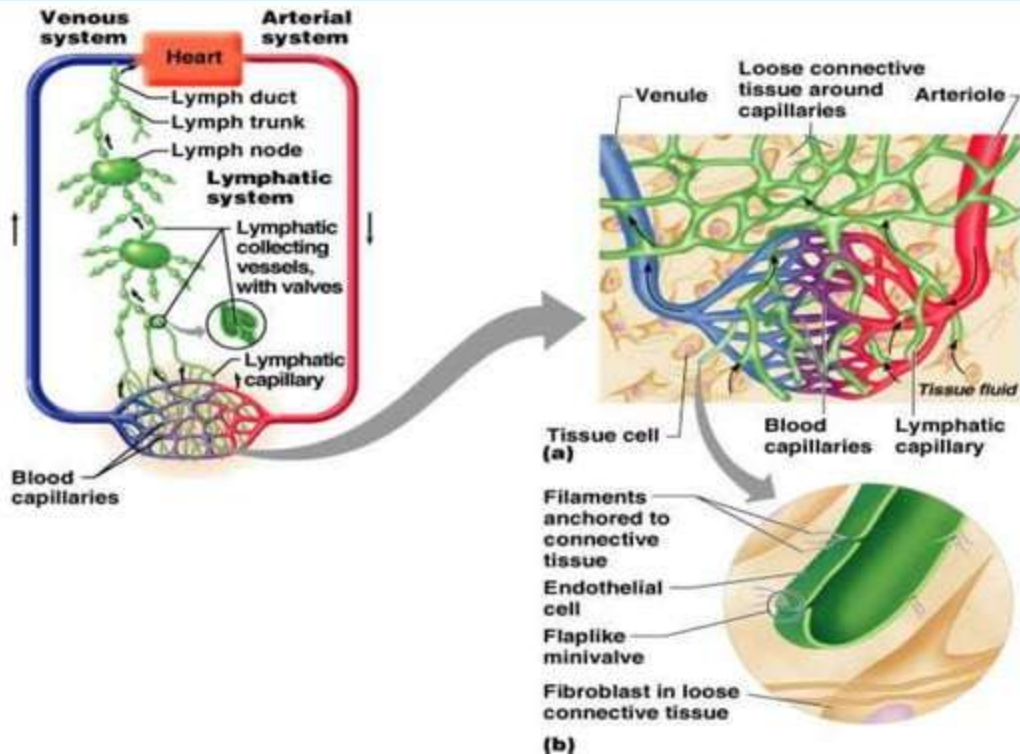


LYMPH

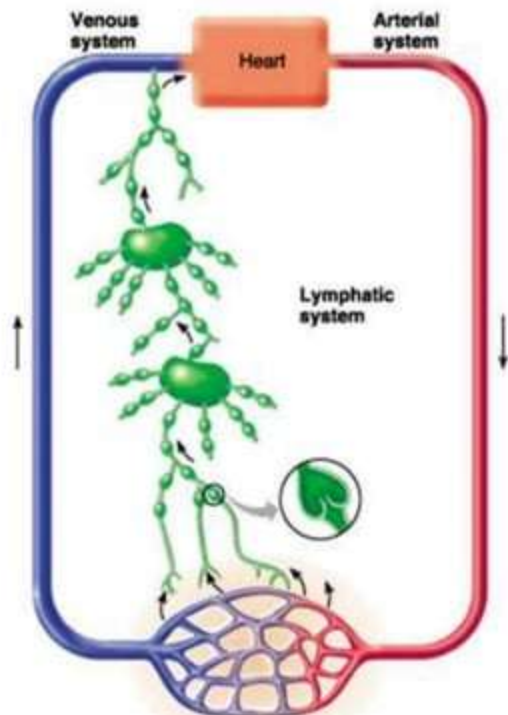
- **What is lymph ?**

Tissue fluid (interstitial fluid) that enters the lymphatic vessels

FORMATION AND TRANSPORT OF TISSUE FLUID



LYMPHATIC SYSTEM



*Essentially a
drainage system
accessory to venous
system*

*larger particles that escape
into tissue fluid can only be
removed via lymphatic
system*

Functions of the Lymphatic System

24-

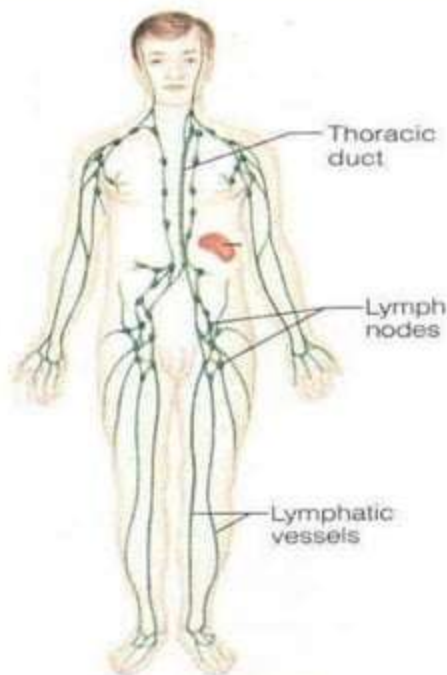
- **Reabsorbs excess interstitial fluid:**
 - returns it to the venous circulation
 - maintain blood volume levels
 - prevent interstitial fluid levels from rising out of control.

- **Transport dietary lipids:**
 - transported through lacteals
 - drain into larger lymphatic vessels
 - eventually into the bloodstream.

- **lymphocyte development, and the immune response**

Components of the Lymphatic System

- Lymph
- Lymphatic Vessels
 - Lymphatic Capillaries
 - Lymphatic Vessels
 - Lymphatic Trunks
 - Lymphatic Ducts
- Lymphatic Organs
 - Thymus
 - Lymph Nodes
 - Spleen
 - Tonsils
- Lymphatic cells



Lymphatic system

Lymphatic capillary



Lymphatic vessel



Lymph node



Lymphatic vessel



Lymphatic trunk

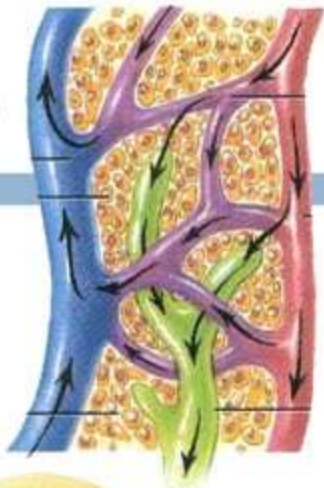


Collecting duct



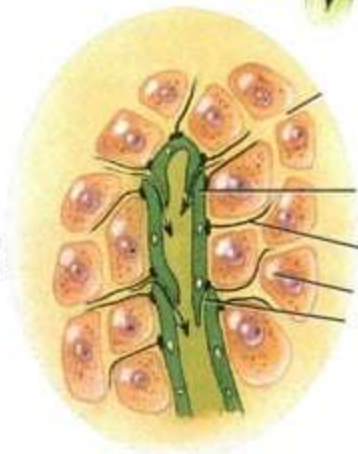
Subclavian vein

Lymphatic Capillaries



Features of structure:

- ❑ Blind end
- ❑ Single layer of overlapping endothelial cells
- ❑ More permeable than that of blood capillary
- ❑ Absent from avascular structures, brain, spinal cord splenic pulp and bone marrow



Lymphatic Capillaries – Lacteals

- The **small intestine** contains special types of lymphatic capillaries called lacteals.
- **Lacteals** pick up not only interstitial fluid, but also dietary lipids and lipid-soluble vitamins.
- The lymph of this area has a milky color due to the lipid and is also called

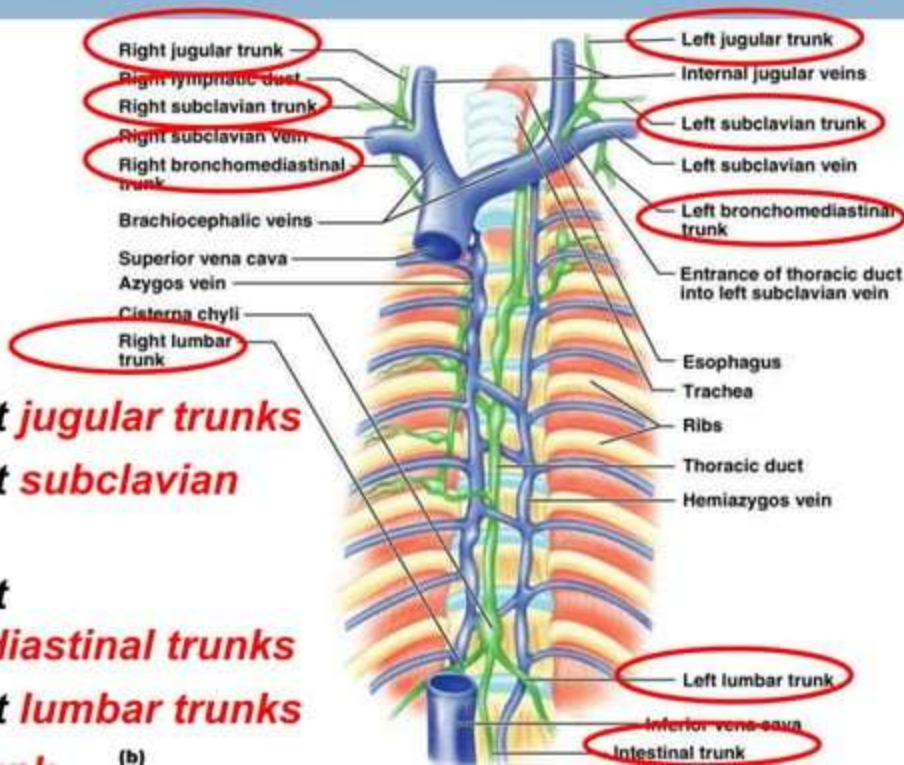
Lymphatic Vessels

Features of structure

- ❑ Three layered wall but thinner than vein,
- ❑ More numerous valves than in vein
- ❑ Interposed by lymph nodes at intervals
- ❑ Arranged in superficial and deep sets



LYMPH TRUNKS



right and left **jugular trunks**

right and left **subclavian trunks**

right and left **bronchomediastinal trunks**

right and left **lumbar trunks**

intestinal trunk

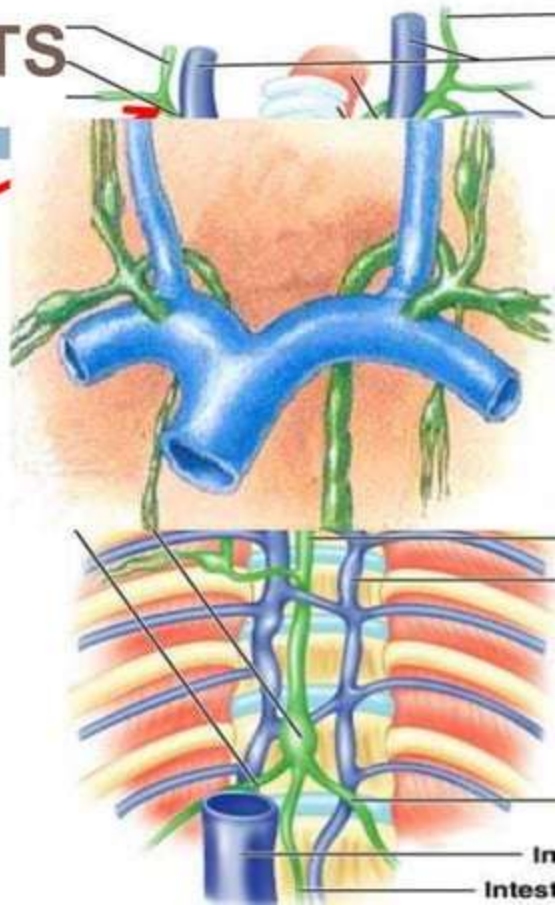
(b)

LYMPHATIC DUCTS

24-

Right lymphatic duct

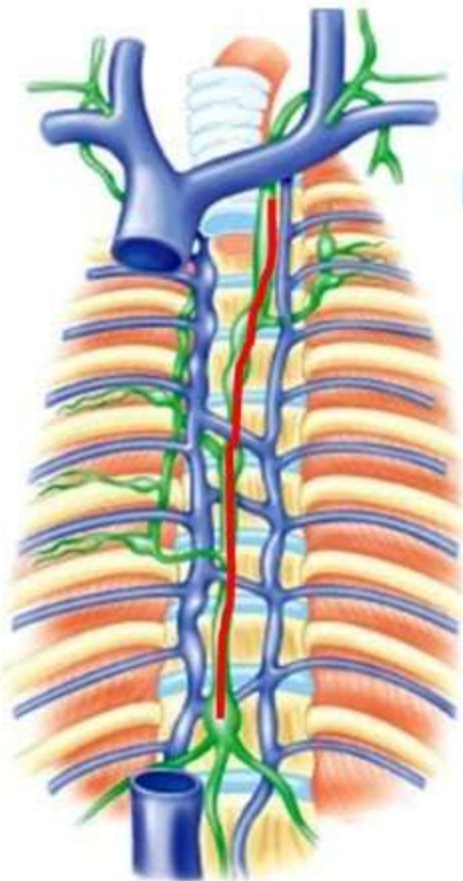
- Formed by union of right jugular, subclavian, and bronchomediastinal trunks
- Ends by entering the right venous angle



LYMPHATIC DUCTS

□ Thoracic duct

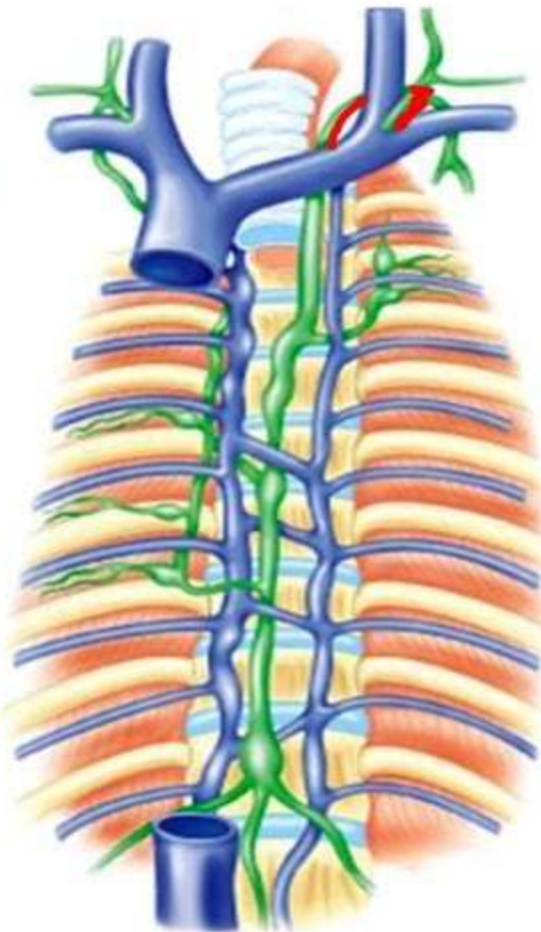
- Begins in front of L1 as a dilated sac, the **cisterna chyli**,
- formed by left and right lumbar trunks and intestinal trunk
- Enter thoracic cavity & ascends
- Travels upward, veering to the left at the level of



THORACIC DUCT....

14

- At the root of the neck, it turns laterally
- arches forwards and descends to enter the left venous angle
- before termination, it receives the left jugular, Subclavian and broncho-mediastinal trunk



DRAINAGE PATTERN

RIGHT LYMPHATIC DUCT

-Receives lymph from right half of head, neck, thorax and right upper limb, right lung, right side of heart, right surface of liver

Area drained by right lymphatic duct

Area drained by thoracic duct



(b) Lymph drainage pattern

THORACIC DUCT -

Drains lymph from lower limbs, pelvic cavity, abdominal cavity, left side of thorax, and left side of the head, neck

Lymphatic Cells

- Also called **lymphoid cells**.
- Located in both the lymphatic system and the cardiovascular system.
- Work together to elicit an **immune response**.
- Types of lymphatic cells are:
 - ▣ **macrophages**
 - ▣ **epithelial cells**
 - ▣ **dendritic cells**
 - ▣ **lymphocytes**

LYMPHATIC ORGANS

Primary organs

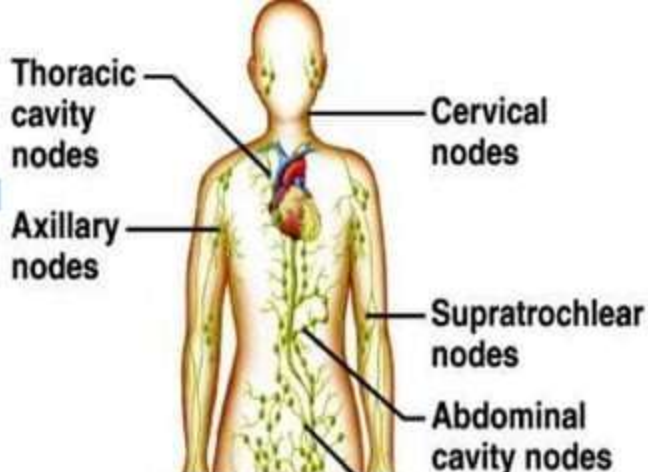
- ▣ Red bone marrow
- ▣ Thymus gland

Secondary organs

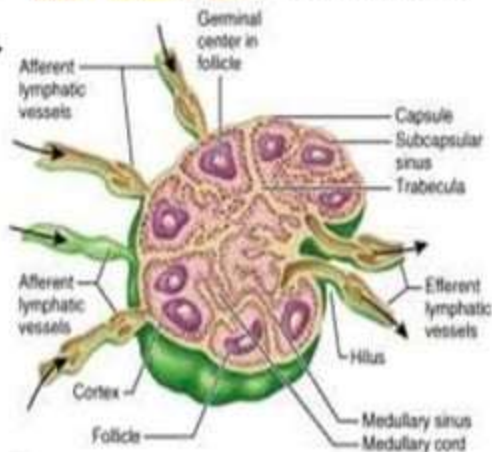
- ▣ Lymph nodes
- ▣ Lymph nodules
- ▣ Spleen

Lymph Nodes

- Small, round or oval
- located along the **pathways** of lymph vessels.
- length from 1 - 25 millimeters
- Typically found in clusters
- receive lymph from many body regions.
- Lymph nodes are also



Inguinal - nodes



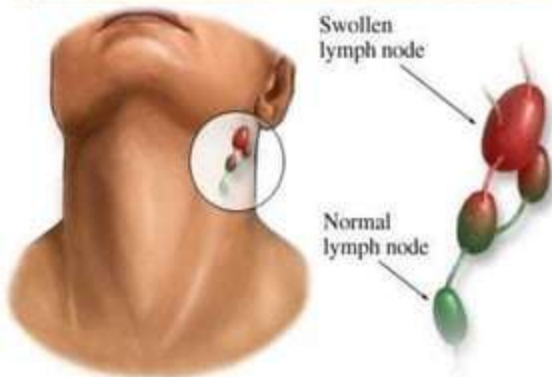
LYMPHEDEMA

- ❑ Occurs due to **accumulation of lymphatic fluid** in the interstitial tissue
- ❑ Sometimes can be appreciated after wearing tight clothing or jewellery on affected limb



LYMPHADENOPATHY

- Means a **disease of the lymph nodes**
- Lymph nodes become swollen/**enlarged** and may be painful to touch



LYMPHOMAS

- **Cancers** originating either from the lymphocytes in the lymph nodes or the lymphatic tissue in organs
- **Risk factors -- HIV, HEPATITIS, EBV infections**

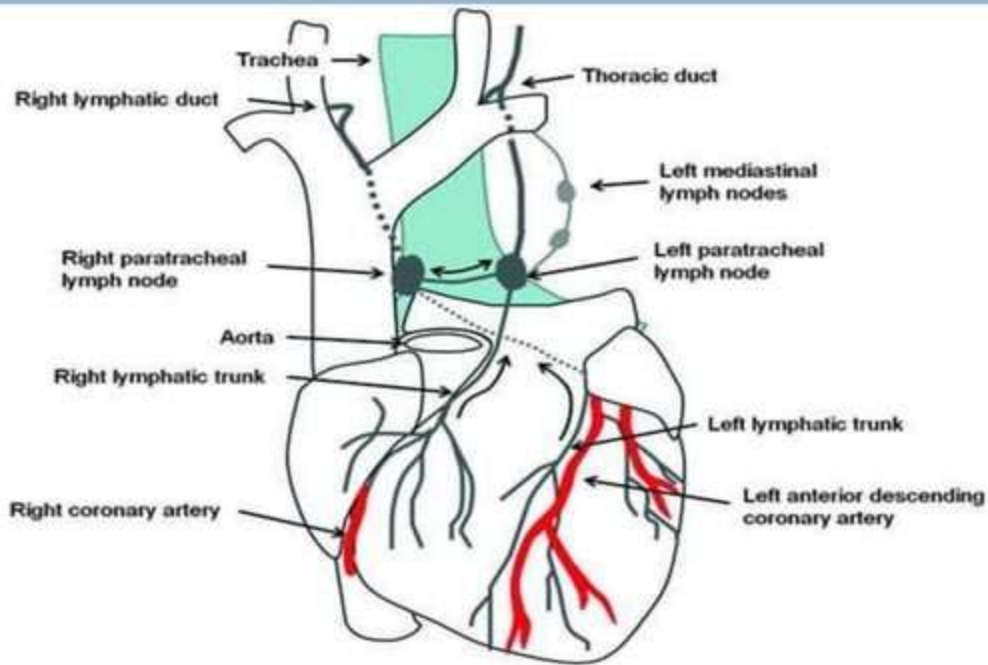


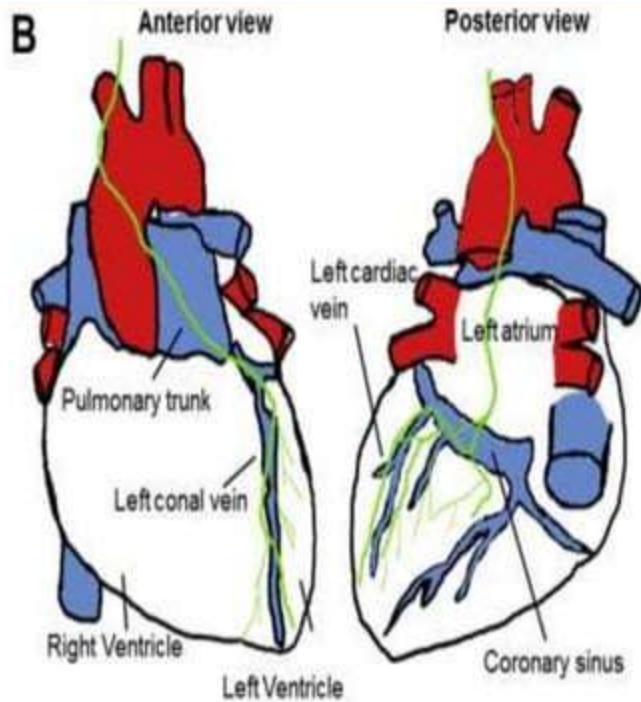
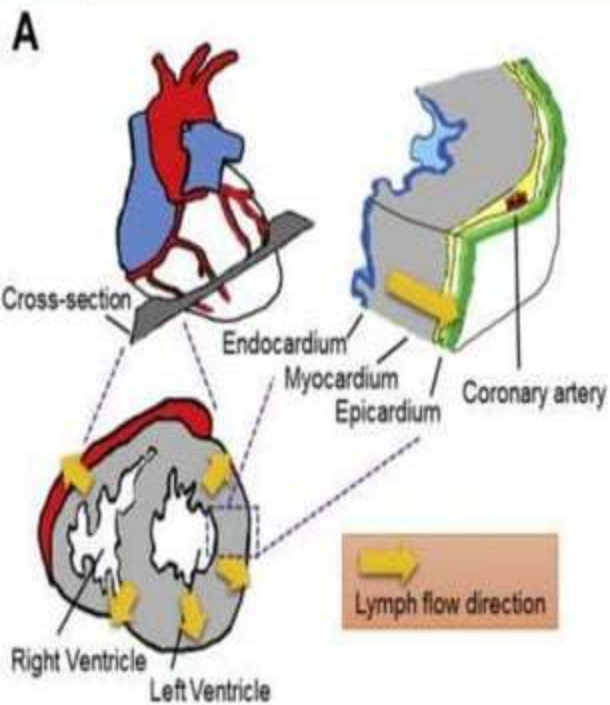
TONSILLITIS

- ❑ **Infection of the pharyngeal tonsils**
- ❑ Tonsils are swollen,
- ❑ Fever and pain during swallowing usually present
- ❑ **Treatment** – surgical removal of tonsils
(TONSILLECTOMY)



Cardiac lymphatic system





- ❑ Myocardial contractions help to propel cardiac lymphatic flow
- ❑ During diastole, when the heart muscle relaxes, the ventricles fill with blood, and the resultant increase in chamber pressure drives the flow of lymph from the subendocardial to the myocardial lymphatics
- ❑ Subsequently, during systole, ventricular contraction supplies the necessary force to propel lymph from the myocardial to the subepicardial lymphatics

- If flow rate becomes reduced-> increased myocardial interstitial edema.
- Cardiac surgery often produces damage to the lymphatic vasculature that can lead to acute or occasionally chronic edema.
- Acute cardiac lymphatic obstruction causes interstitial myocardial edema, which in turn degrades ventricle performance, characterized by decreased contractility and increased diastolic stiffness

IMPORTANT FACTS



QUESTION. 1

- I am a part of lymphatic system and protect the body by clearing worn out red cells and foreign bodies from the blood stream. Who am I?



- A. Thymus
- B. Palatine Tonsil
- C. Spleen
- D. Lymph

QUESTION. 2

Which is the correct statement about the Lymphatic system?

- A. It Reabsorbs excess interstitial fluid and returns it to the venous circulation.**
- B. Transports dietary lipids through lacteals.**
- C. Helps in lymphocyte development, and the immune response.**
- D. All of the above**

QUESTION. 3



- Which disease caused by mosquito bite blocks the lymphatic drainage causing huge swelling of body part (commonly lower limb)

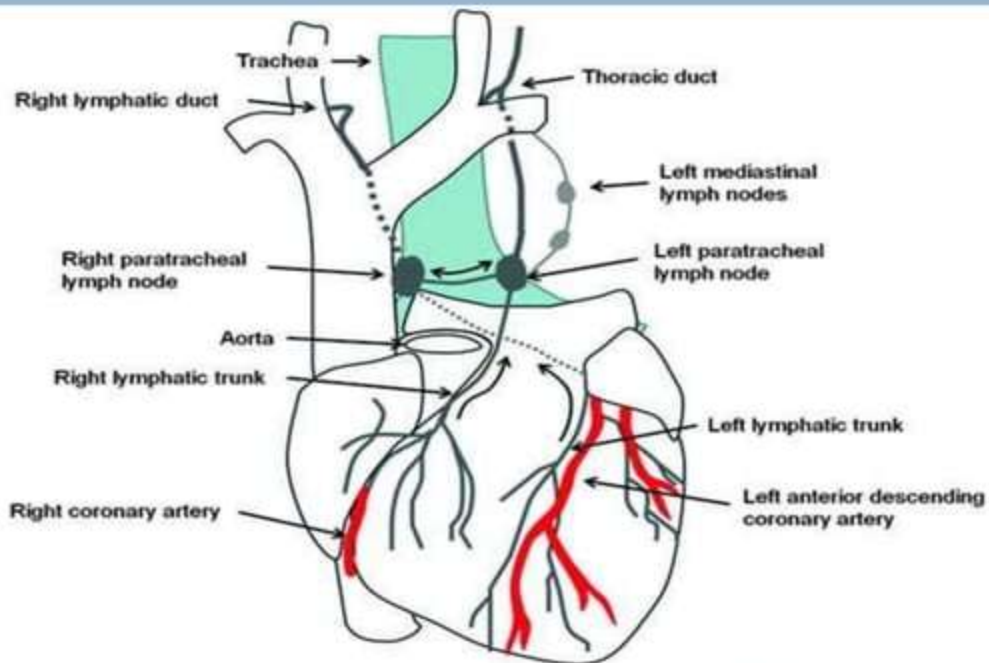
- A. Malaria
- B. Filaria
- C. Dengue
- D. Yellow fever



Before Treatment



After Treatment





4/14/2024